

IN THE UNITED STATES PATENT & TRADEMARK OFFICE

Application No.: 10/520,366

New Claims (23 November 2006)

Claims 1 - 19 canceled.

20. (New) A method of processing a surface of a dielectric carrier material to adapt it for securely attaching thereto a cover layer by precipitation, comprising the steps of:

irradiating the surface at predetermined influx angles by at least one beam of high energy heavy ions of predetermined density and energy dissipation to generate within the carrier material a first plurality of latent ion traces extending into the carrier material to a predetermined depth and at a predetermined influx angle and a second plurality of latent ion traces substantially similar to and intersecting the latent ion traces of the first plurality; and

subjecting the ion traces of the first and second plurality to a chemical etching process for forming recesses extending from the surface to within the carrier material at an aspect ratio of A from about ≥ 3 to about 4 and whereby two or more of such recesses intersect below the surface to form common chambers.

21. (New) The method of claim 20, further including the step of collimating the at least one beam.

22. (New) The method of claim 21, further including the steps of blocking at least part of the at least one beam and of selectively decelerating the ions.

23. (New) The method of claim 22, further including the steps of placing a mask into the irradiation beam and of passing the carrier material through the beam at least once.

24. (New) The method of claim 20, wherein the carrier material comprises a polymeric film moved between dispensing and take-up rollers over a deflection roller in a path of substantially inverted V-shaped configuration.

25. (New) The method of claim 24, wherein the at least one beam of heavy ions impinges the surface of carrier material at opposite sides of the deflection roller.

26. (New) The method of claim 25, wherein the inclination of the carrier material at opposite sides of the deflection roller corresponds to the predetermined influx angle.

27. (New) The method of claim 25, further including the step of mounting a mask over the deflection roller into the beam of heavy ions.

27. (New) The method of claim 20, wherein the influx angle measures between 30° and 70°.

28. (New) The method of claim 20, wherein the carrier material is a polymeric film selected from the group consisting of polyimide, polyethylene terephthalate and polyester.

29. (New) The method of claim 20, wherein the polymeric material is of a thickness from about 23 µm to about 50 µm. layer is a metal selected

30. (New) The method of claim 20, wherein the layer is a metal selected from the group consisting of copper and aluminum.

31. (New) The method of claim 20, wherein the chemical etching is carried out in a solution of NaOH.

32. (New) The method of claim 20, wherein the heavy ion beam is one of a

$^{84}\text{Kr}^+$ krypton beam and a $^{40}\text{Ar}^+$ argon beam set at a radiation density of $5 \cdot 10^7 \text{ cm}^{-2}$.

33. (New) The method of claim 32, wherein the impact energy of the $^{84}\text{Kr}^+$ krypton beam ions on the carrier material is set at 1.2 MeV/amu to result in a medium penetration depth of about 20 μm .

33. (New) The method of claim 33, wherein the chemical etching results in recesses of a diameter of about 2 μm and a depth of about 18-19 μm .

34. (New) The method of claim 33, further including the steps of sputtering a seed layer of copper of a thickness of from about .2 to about .4 μm onto the surface and into the recesses followed by a galvanic precipitation of a layer of copper.

35. (New) The method of claim 34, wherein the seed layer is of a thickness of from about .2 μm to about .4 μm thickness and the copper layer is of a thickness of from about 5 μm to about 140 μm .

36. (New) The method of claim 32, wherein the impact energy of the $^{40}\text{Ar}^+$ argon beam ions on the carrier material is set at .11 MeV/amu to result in a medium penetration depth of about 7 μm .

37. (New) The method of claim 36, wherein the chemical etching results in conical recesses of a depth of about 7 μm and an opening diameter of from about 1.9 μm to 2.1 μm .

38. (New) The method of claim 37, further including the step of precipitating, by vacuum deposition at an operating pressure of about $\square 1 \cdot 10^{-1}$ mbar a layer on the surface of the carrier material.

39. (New) A system for processing a surface of a dielectric carrier material

to adapt it for securely attaching thereto a cover layer by precipitation,
comprising:

means for placing the dielectric carrier material in a predetermined
position;

means for generating at least one beam of high energy heavy ions
along a predetermined path;

means for directing the ions into the carrier material through one
surface thereof to form intersecting latent ion traces therein any at least two
of which being adapted to be etched into a common volume;

means mounted between the source and the dielectric carrier material
for selectively blocking at least a portion of the beam; and

means mounted between the source and the means for blocking for
selectively decelerating the ions.